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BY: Suzanne Shadley
Suzanne Shadley

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Diamond et al.		
Serial No.:	09/596,851	Group Art Unit:	1627
Filed:	June 19, 2000		
For:	High Throughput Screen For Identifying Polymerization Catalyst From Potential Catalysts	Examiner:	M. Garcia Baker

#22 3108 5603

Santa Clara, California
April 30, 2003

Assistant Commissioner for Patents and Trademarks
Washington, D.C. 20231

DECLARATION OF RICHARD F. JORDAN UNDER 37 C.F.R. §1.132

I, RICHARD F. JORDAN, hereby declare as follows:

1. I am a Professor of Chemistry at the University of Chicago. I make this declaration in support of Applicants' response to the issues raised by the Office.

2. I was a Postdoctoral Fellow at the University of Wisconsin from 1981-1983, graduated from Princeton University with a Ph.D. in Chemistry in 1981 and from Rutgers University with a Bachelor of Arts in Chemistry in 1975 with High Honors. I have taught as an Assistant Professor of Chemistry at Washington State University and as an Associate Professor of Chemistry at the University of Iowa. I have taught as a Professor of Chemistry at the University of Iowa and the University of Chicago where I currently teach. I worked as a Research Chemist at Arco Chemical Company

in Glenolden, Pennsylvania from 1975-1976. I have received numerous awards and served in various capacities as a lecturer, organizer and board member for many different chemical groups and periodicals. For example, I presented at the Frontiers in Chemistry Lectureship at the University of Iowa in 2002, and was the Humphrey Lecturer at the University of Vermont in 2002. I was the organizer for the Symposium on Recent Advances in Organometallic Chemistry for the Fall National ACS Meeting in 2002, and have served on the Editorial Advisory Board for the *Journal of Organometallic Chemistry* from 2002 - present. I have authored or co-authored over 125 publications, many of which are related to olefin polymerization. Examples include, E. J. Stoebenau III, R. F. Jordan, Coordination of Alkenes and Alkynes to a Cationic d^0 Zirconocene Alkoxide Complex, 125 *J. Am. Chem. Soc.* 3222-3223 (2003); S. R. Foley et al., Reaction of Vinyl Chloride with Late Transition Metal Olefin Polymerization Catalysts, *J. Am. Chem. Soc.* 2003, in press; K. Michiue et al., Olefin Polymerization by Tris(pyrazolyl)borate Group 4 Metal Catalysts, 86 *Polymeric Materials: Science and Engineering* 295-296 (2002); S. Murtuza et al., Ethylene Polymerization Behavior of Tris(pyrazolyl)borate Ti(IV) Complexes, 21 *Organometallics* 1882-1890 (2002); and J. F. Carpentier et al., d^0 Metal Olefin Complexes. Synthesis, Structures and Dynamic Properties of $(C_5R_5)_2Zr(OCMe_2CH_2CH_2CH{=}CH_2)^+$ Complexes: Models for the Elusive $(C_5R_5)_2Zr(R)(olefin)^+$ Intermediates in Metallocene-Based Olefin Polymerization Catalysis, 122 *J. Am. Chem. Soc.* 7750-7767 (2000). My CV is attached hereto as Appendix A.

3. I have reviewed the May 21, 2002 Office action, the September 23, 2002 Applicants' reply to the action, the December 31, 2002 Final Office action, the pending claims and the specification in the above-identified patent application. I have also reviewed PCT application numbers WO 97/42232 to Van Tol et al. and WO 97/32208 to Willson, both of which were cited by the actions, and the presentation (attached to this Declaration as Exhibit B) by Dr. James C. Stevens of The Dow Chemical Company.

4. I understand the inventions claimed in this patent application (*i.e.,* the inventions defined by claims 16 and 42, together with claims depending therefrom) are directed

to methods for screening potential catalysts for polymerization performance for at least a second monomer, using a first monomer. In my opinion, each of the methods requires concurrently reacting an array of at least 8 potential polymerization catalysts with a first monomer under polymerization conditions and using the results of those reactions as a figure of merit for planning of additional screens, laboratory or commercial polymerization or copolymerization. More specifically, each of the claims require (i) reacting at least 8 potential polymerization catalysts with a first monomer, (ii) evaluating the results of the polymerization reactions, and (ii) using those results as a figure of merit for predicting the behavior of those catalysts with a second monomer.

5. As I understand, additional features or steps are required in certain claims, including for example, copolymerizing the first and second monomers using one of the catalysts in the array based upon the polymerization performance of the catalyst (claim 17), the array of potential catalysts comprises a substrate having wells with each of the at least 8 catalysts residing in a different well of the substrate (claim 24), adding other compositions to the wells other than the first or second monomers or the catalysts (claim 25), and determining properties at a rate of 20 minutes or less per potential catalyst (claim 43).

6. It is my understanding that the claimed invention uses the results of a first set of easy-to-perform experiments to predict the results in second harder-to-perform polymerizations. It is my opinion that this approach is very advantageous because one can screen catalysts by polymerization with a first monomer which is easy to handle (first polymerization), and then use the results to predict the performance of the catalysts with another monomer or mixture of monomers which may be more difficult to handle (second polymerization). As I understand it, catalysts which are predicted to function well in the second polymerization by virtue of their good performance in the first polymerization are selected for further study or used in the ultimate application. Catalysts which are predicted not to function well in the second polymerization by virtue of their poor performance in the first polymerization are not

studied further. Examples 1-17 in the above-referenced application show how new Hf ethylene/octane copolymerization catalysts were discovered using these methods. It is my opinion that one skilled in the art would not have been able to predict that this catalyst would function so well using current methods.

7. I have reviewed the WO 97/42232 reference to Van Tol, which I understand has been relied upon by the Examiner in rejecting the claims. As I read the reference, Van Tol is directed towards a standard olefin polymerization process. Van Tol describes the process of polymerizing one or more α-olefins using reduced group 4-6 metal catalysts to make polymers for use as oil additives. In my opinion, the Van Tol reference does not disclose, claim or suggest new methods for the discovery of olefin polymerization catalysts, new catalyst screening categories, or new methods for identification of superior catalysts from libraries. In my opinion, Van Tol does not predict the polymerization performance of a catalyst for a second monomer or mixture of monomers based on the performance of that catalyst with a first monomer. The Van Tol reference shows three different catalysts used to polymerize three different monomers or mixtures of monomers. The Van Tol reference does not compare the performance of the three catalysts described in the examples with the same monomer and then use the results to predict the performance of the catalysts in a different polymerization. Van Tol does not compare the performance of the three catalysts with a first monomer and then use the results to guide subsequent experiments with a different monomer. Thus, in my opinion, the Van Tol reference simply does not have anything to do with the catalyst discovery methods claimed in the above-referenced application.

8. As I understand it, the Willson reference is directed to methods for the rapid screening of catalysts. In the Willson reference, a catalyst for a given reaction is discovered by testing an array of catalysts for their performance in that reaction, and choosing the one that performs the best. In my opinion, Willson does not teach a method of screening a set of catalysts for the polymerization of a first monomer and using the results to predict the performance of that set of catalysts in polymerization of other

monomers. It is my opinion that Willson simply adds a rapid screening component to the traditional method of testing catalysts for the actual reaction that they will ultimately be used for.

9. I do not believe that the phrases "using the polymerization performance as a figure of merit for planning" and "using the determination as a figure of merit for planning" as recited in claims 16 and 42, respectively, are confusing. I understand that these phrases mean that the results of the polymerization reactions, whether they be polymerization performance of the catalyst or a property of the polymer sample, have to overcome a certain threshold before the catalyst will be further considered for additional experimentation. Thus, the figure of merit is the particular property being measured for the threshold performance for the catalyst to advance in the process. The threshold of performance is determined by the experiment designer and is typically set sufficiently high so that many catalysts do not meet that performance (effectively thus screening the catalysts, i.e., throwing some out and proceeding with others). Also, the performance threshold is set high enough that a prediction can be made about the catalyst when the performance of the catalyst exceeds the threshold. In other words, the prediction (or prophesy), as claimed, means that the measured polymerization performance with the tested monomer will translate to a certain level of polymerization performance with other monomers for that same catalyst.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that the statements herein were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001, and that such willful false statements may jeopardize the validity of the above-identified application or any patents issuing thereon.

Date: _____, 2003

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Richard F. Jordan

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Date: April 30, 2003

Richard F. Jordan